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ABSTRACT

This paper begins with the discussion of how certain developments in psychology have influenced present educational methods, and how recent work in learning theory, developmental psychology, and psychometrics strongly suggests new directions for educational research and practice. This theme is discussed in the context of a central problem in education--the individualization of instruction, or, in other terms, adapting educational environments to individual differences. The paper focuses on the education of the young child in the preschool and elementary school years, although the discussion seems applicable to all levels of our educational system. A selective mode of education is characterized by minimal variation in the conditions under which individuals are expected to learn. A narrow range of instructional options is provided, and a limited number of ways to succeed are available. In contrast, an adaptive mode of education assumes that the educational environment can provide for a wide range and variety of instructional methods and opportunities for success. Alternative means of learning are adaptive to and are in some way matched to knowledge about each individual--his background, talents, interests, and the nature of his past performance. (Author/JM)

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NOTE: Following this issue of the Newsletter, all editorial correspondence will be handled by the new Editor, Professor John Chilcott, Department of Anthropology, University of Arizona, Tucson. The Newsletter phone number will be (602) 884-2964. All correspondence regarding subscription, membership, or business matters will continue to be handled by the American Anthropological Association, 1703 New Hampshire Avenue, N. W., Washington, D. C. 20009, (202) 232-8800.

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THE NEW APTITUDES AND ADAPTIVE EDUCATION

Robert Glaser
University of Pittsburgh

[Ed. Note: Challenging anthropologists to respond to the problems of an evolving educational approach to individual and group differences, Professor Glaser originally planned to give this paper in the symposium on "Reference Groups for Researchers in Anthropology and Education" at the 1972 AAA meetings. Unable to get to Toronto then, he has allowed us to add this paper to those published from that symposium in the previous Newsletter. Robert Glaser is Director of the Learning Research and Development Center at the University of Pittsburgh, a past President of the American Educational Research Association, and a well-known educational psychologist.]

In this paper, I describe an approach to education which, I believe, will become increasingly prevalent. I will describe it in general terms because the specific forms of its application will vary with the setting in which it occurs. Particularly, by publishing in this newsletter at the request of the editor, I am eager to solicit the interest of anthropologists and sociologists with respect to two questions: (1) How can the learning environment created by this approach be studied? --how are the problems for investigation to be formulated? and (2) What predictions can be made of the influence of this approach on the culture and society of the school and the broader community? --I have hinted at my own primitive thoughts on this latter in a very brief concluding paragraph. Much of what I have to say has already been said in a previous paper (Glaser, 1972), but for present purposes, I emphasize some history and background, and the contrast between selective and adaptive education.

To begin, I propose to show how certain developments in psychology have influenced present educational methods, and to show further how recent work in learning theory, developmental psychology, and psychometrics strongly suggests new directions for educational research and practice. I shall discuss this theme in the context of a central problem in education--the individualization of instruction or, in other terms, adapting educational environments to individual differences. I shall focus on the education of the young child in the preschool and elementary school years, although what I have to say seems applicable to all levels of our educational system. The problem obviously has been a persistent one; it has been recognized and proclaimed at least since the beginning of this century, three generations ago. Very early in the century, Edward L. Thorndike (1911) published a monograph entitled Individuality. His editor's introduction summarizes the then current situation by noting that the teaching profession and education in general were showing signs of a violent reaction against the uniformity of method that for so long clutched and mechanized the schools. The deadening effects of uniformity needed to be recognized. Parents and students had been the first to notice this; now the professional consciousness was deeply penetrated because the teachers themselves realized that they were caught in the iron machinery of their own making. These turns of phrase were written in 1911, and throughout the twentieth century, the problem has been raised again and again.

In 1925, a major effort appeared in the 24th yearbook of the National Society for the Study of Education entitled Adapting the Schools to Individual Differences. Carleton Washburne's introduction states in forceful terms that the widespread use of intelligence and achievement tests has made every educator realize that children vary greatly as individuals, and "throughout the educational world, there has therefore awakened the desire to find some way of adapting schools to the differing individuals who attend them (Washburne, 1925)." Shouts of alarm have been ubiquitous; many suggestions have been made and a few sustained experiments have been launched. Nevertheless, it is now 1972, and time goes by with still only a recognition of the problem, but as yet, no directions towards solution realized. This is the situation that I would like to examine.

An analysis of the problem involves the idiosyncracies of two major fields of psychology. As is known, the English and German traditions of the nineteenth century gave rise to two separate disciplines of scientific psychology: psychometrics and experimental psychology. It was the psychometricians with their emphasis on technology who had significant impact upon educational methods. Indeed, the major activity in educational psychology revolved around measurement and psychometric practice. Psychometrics emphasized the

nature of individual differences and the utility of measuring these differences for education. Learning variables and modification of the educational environment, however, were not part of this field. Meanwhile, the experimental psychologists went into the laboratory to work on the basic foundations of their science, and concentrated on discovering and formulating general laws of behavior unencumbered by the additional complication of individual differences. For the most part, individual differences became the error variance in experimental design.

The separation of these two fields, both of which are necessary for a complete conception of instructional theory, led to assumptions about individual differences uninfluenced by knowledge of learning and cognitive processes, and led to theories of learning uninfluenced by the effect of individual difference parameters. In this climate, characterized by the parallel, but not combined labors of two major disciplines relevant to education, the search for an educational system that responds to individuality has been going on. To be as clear as I can, I will overstate the case by contrasting two kinds of educational environments. One I shall call a selective educational mode, and the other, an adaptive educational mode. It appears that we have produced a selective educational mode while aspiring toward an adaptive one.

A selective mode of education is characterized by minimal variation in the conditions under which individuals are expected to learn. A narrow range of instructional options is provided, and a limited number of ways to succeed are available. Consequently, the adaptability of the system to the student is limited, and alternative paths that can be selected for students with different backgrounds and talents are restricted. In such an environment, the fixed or limited paths available require particular student abilities, and these particular abilities are emphasized and fostered to the exclusion of other abilities. In this sense, the system becomes selective with respect to individuals who have particular abilities for success--as success is defined and as it can be attained by the means of instruction that are available. The effectiveness of the system, for the designers of the system and for the students themselves, is enhanced by admitting only those students who score very highly on measures of the abilities required to succeed. Furthermore, since only those students who have a reasonable probability of success are admitted, little change in the educational environment is necessary, and the differences among individuals that become important to measure are those that predict success in this special setting.

In contrast to a selective mode, an adaptive mode of education assumes that the educational environment can provide for a wide range and variety of instructional methods and opportunities for success. Alternate means of learning are adaptive to and are in some way matched to knowledge about each individual--his background, talents, interests, and the nature of his past performance. An individual's styles and abilities are assessed either upon entrance or during the course of learning, and certain educational paths are elected or assigned. Further information is obtained about the learner as learning proceeds, and this, in turn, is related to subsequent alternate learning opportunities. The interaction between performance and the subsequent nature of the educational setting is the defining characteristic of an adaptive mode. The success of this adaptive interaction is determined by the extent to which the student experiences a match between his specific abilities and interests, and the activities in which he engages. The effect of any election of or assignment to an instructional path is evaluated by the changes it brings about in the student's potential for future learning and goal attainment. Measures of individual differences in an adaptive educational mode are valid to the extent that they help to define alternate paths that result in optimizing immediate learning, as well as long-term success.

A selective educational mode operates in a Darwinian framework, requiring that organisms adapt to, and survive in, the world as it is; an alternative is that the environment can be changed. If we design only a relatively fixed environment, then a wide range of background capabilities and talented accomplishments might be lost from view because of the exclusive reliance upon selection for survival in a particular setting. What is learned and the way in which one learns, and learns to learn, may take on less importance or receive less emphasis in a setting that offers more options for learning.

When one compares a selective educational mode with adaptive educational possibilities, one asks whether the particular selective tests and sorting out devices that are part of present schooling fail to consider abilities and talents that might emerge as important in a more interactive setting where there is room for adjustment between abilities and modes of learning. In principle, and in contrast to traditional practice, there seems to be no reason why educational environments cannot be designed to accommodate more readily to variations in the backgrounds, cognitive processes, interests, styles, and other requirements of learners.

In any educational mode, then, the individual differences that take on outstanding importance are those that have ecological validity within a particular system. In our traditional selective educational mode, the individual differences that are measured in order to make educational assignments center around the concepts of intelligence and aptitude. This bears looking into.

Of the various attempts to measure intellectual ability that began at the turn of the century, Binet's work emerged strongly. It was a practical endeavor to predict school success. The Minister of Public Education in France supported Binet's attempts to determine what might be done to ensure the benefits of instruction to retarded children. It was decided that children suspected of retardation be given an examination to certify that, because of the state of their intelligence, they were unable to profit from instruction as given in ordinary schooling. Scholastic success in an essentially fixed educational mode was the predictive aim toward which this test was directed, for which its items were selected, and in terms of which its overall effectiveness was validated; although to be fair to Binet, his writings do indicate a great deal of sensitivity to the possibilities for individual differential diagnosis. Nevertheless, the validation of a test is a very specific procedure in which individuals are exposed to particular kinds of test items that are constructed to predict a particular criterion measure. No test is simply valid in general, but for a specific purpose and a particular situation. The concept of Binet's work has persisted, and as Cronbach points out in the 1970 edition of his well-known book on the essentials of psychological testing: "Current tests differ from those of the earlier generation just as 1970 automobiles differ from those of about 1920: more efficient, more elegant, but operating on the same principles as before (Cronbach, 1970)."

At the present time, our most respected textbooks on the subject (Cronbach, 1970; Tyler, 1965) carefully point out that if we base our conclusions about what intelligence tests measure on their most effective use--that is, their predictive validity--then the verdict is that they are tests of scholastic aptitude or scholastic ability; these tests measure certain abilities that are helpful in most school work, as it is conducted in present-day school situations. This same ideology has penetrated the entrance requirements of almost all institutions of higher education (vide Wing and Wallach, 1971), and strongly determines the character of primary and secondary school education. It is further to be observed that these tests of scholastic aptitude, when considered over all school levels, account for only 35 to 45 percent of the variation in school performance.

Being aware of this, we have not been remiss in attempting to probe deeper into the different facets of human behavior that might allow us to be more sensitive to individual differences. Some years ago, as a result of some dissatisfaction with the research on the IQ and together with the results of work on multiple factor analysis, there was a deemphasis of the concept of general intelligence that led to the popularity of tests of differential aptitudes. At that time, in addition to an overall measure of "intelligence" or "general aptitude," schools began to employ tests that provided measures on a variety of factors such as spatial, mechanical, and abstract reasoning aptitudes. More than predicting overall scholastic success, these test batteries attempted to predict differential success in school programs leading to different vocations which appeared to require different aptitude patterns.

In 1964, a careful analysis was done by McNemar of the validity coefficients of certain widely used, multi-test differential aptitude batteries. He argued from his analysis that "aside from tests of numerical ability having differential value for predicting school grades in math, it seems safe to conclude that the worth of the multi-test batteries as differential predictors of achievement in school has not been demonstrated (McNemar, 1964)." McNemar further concluded that "it is far from clear that tests of general intelligence have been outmoded by the multi-test batteries as the more useful predictors of school achievement." In general, a simple, unweighted combination of tests of verbal reasoning and numerical ability predicted grades as well as, or better than, any other test or combination of more specific ability tests; and these tests of verbal and numerical ability were similar to what was measured in group tests of intelligence. More recent evidence reaffirms McNemar's conclusion. For example, a 1971 technic l report of the College Entrance Examination Board points out that there is certainly no reason why the Scholastic Aptitude Test (SAT) could not include measures from other domains in addition to the verbal and mathematical skills tested, and that research to identify these other domains has been an enduring concern. Yet, over the 40 years of the SAT's existence, no other measures have demonstrated such a broadly useful relationship to the criterion of college achievement (Angoff, 1971).

All this suggests the following observation: Given the characteristics of our present educational system, certain general measures of the ability to manipulate numbers and words predict, to a limited extent, the ability to emerge victorious from the educational environment provided. However, any attempt to further differentiate specific ability patterns that relate to specific educational programs is, at best, no more successful than the usual general ability measures or intelligence measures. Why is this so, and what does it mean?

One clue to answering this question is to note that tests of general ability, intelligence, and aptitude follow the accepted practice of attempting to predict the outcomes of learning in our rather uniform educational programs. These tests make little attempt to measure those abilities that are related to different ways of learning. The generally used scholastic aptitude tests are designed for and

validated in terms of predictions of the products of learning in a particular setting. They are not designed to determine the different ways in which different students learn best, to measure the basic processes that underlie various kinds of learning, nor to assess prerequisite performance capabilities required for learning a new task.

Psychologists and educational researchers, again, have not been insensitive to this state of affairs, and there has been a recent emergence of concern about the relationships between measures of individual differences and learning variables. To a large extent, this work was heralded by the 1957 book by Cronbach and Gleser entitled Psychological Tests and Personnel Decisions and its second edition in 1965. This book was concerned with the development of a decision-theory model for the selection and placement of individuals into various "treatments." The word treatment was given a broad meaning, referring to what is done with an individual in an institutional setting; e.g., for what job an applicant should be trained in industry, to what therapeutic method a patient should be assigned, and in education, to which particular educational program or instructional method a student should be assigned or given the opportunity to select. This theoretical analysis attempted to show that neither the traditional predictive model of psychometric work for the traditional experimental comparison of mean differences was an adequate formulation of these practical decisions, including the kinds of decisions required for the individualization of instruction.

Cronbach and Gleser pointed out that aptitude information is useful in adapting to treatments only when aptitude and treatment can be shown to interact. In a non-technical way, this can be explained as follows: Given a measure of aptitude, and two different instructional methods, if the aptitude measure correlates positively with success in both treatments, then it is of no value in deciding which method to suggest to the student. What is required is a measure of aptitude that predicts who will learn better from one curriculum or method of learning than from another. If such measures can be developed, then methods of instruction can be designed, not to fit the average person, but to fit an individual or groups of students with particular aptitude patterns. Unless one treatment is clearly best for everyone, treatments should be differentiated in such a way as to maximize their interaction with aptitude variables.

Following up on this logic, educational psychologists have been active in experimentation and have searched deeply into the literature of their field. The line of investigation has been called the ATI problem (ATI standing for aptitude-treatment interaction). The intent of the work is different from that of the previously mentioned work on differential aptitude testing. In the differential aptitude testing research, emphasis was placed on determining the relationship between measured aptitudes and learning outcomes under relatively fixed educational programs. In the ATI work, the emphasis is on determining whether aptitudes can predict which one of several learning methods might help different individuals attain similar educational outcomes. To be clearer, the earlier differential aptitude work assumed several different educational programs, each one leading to different careers and attempted to select individuals with respect to their potential success in each program. The ATI work essentially assumes that if within each of these several programs there were different instructional options, then aptitude patterns might predict the option in which a student would be most successful.

Several recent comprehensive reviews report detailed analyses of ATI studies (Bracht, 1969; Bracht and Glass, 1968; Cronbach and Snow, 1969), and the conclusions of these reviews strongly suggest that our generally used aptitude constructs are not productive dimensions for measuring those individual differences that interact with different ways of learning. These measures derived from a psychometric, selection-oriented tradition do not appear to relate to the processes of learning and performance that have been under investigation in experimental and developmental psychology. The treatments investigated in the ATI studies were not generated by any systematic analysis of the kinds of psychological processes called upon in particular instructional methods, and individual differences were not assessed in terms of these processes.

Perhaps we should have known all this, and not have had to learn it the hard way; because I am reminded of Lee Cronbach's APA presidential address of 1957. In discussing these general concerns, he said: "I believe that we will find these aptitudes to be quite unlike our present aptitude measures." He went on to say, "Constructs originating in differential psychology are now being tied to experimental variables. As a result, the whole theoretical picture in such an area as human abilities is changing (Cronbach, 1957)." I believe that Cronbach was a moment or two ahead of his time in his address 15 years ago. But, I also believe that education and psychology have since moved in directions which make adaptation to individuals in educational settings more likely: research on cognitive processes, psychometric methodologies, deeper attempts at individualization, and the cultural Zeitgeist seem to offer enabling potentials. I shall go on to describe some of this, but first let me recapitulate the question that I am attempting to answer.

The general question takes the form of the following set of questions: (1) How can knowledge of an individual's patterns of abilities and interests be matched to the method, content, and timing of his instruction? (2) How can the educational

environment be adjusted to an individual's particular talents, and to his particular strengths and weaknesses as defined in terms of social and personal objectives for education? and (3) The other way around--how can an individual's abilities be modified and strengthened to meet the prerequisite demands of available means of instruction and available educational opportunities?

The implications of my discussion so far appear to support the hypothesis that the human performances that we identify with the words "general ability," "scholastic intelligence," and "aptitudes" have emerged on the basis of measurement and validation procedures in an educational system of a particular kind. These intelligence and aptitude factors have taken on significance because of their correlation with instructional outcomes, and not because of their relationship to learning processes or different educational techniques. Furthermore, since our educational system provides a limited range of educational options for adapting to different individuals, these general abilities override the influence of any more specific abilities that might be additionally useful if alternate ways of learning were available.

The question now is: What are these "new aptitudes?" Current lines of research indicate that a fruitful approach is the conceptualization of individual difference variables in terms of the process constructs of contemporary theories of learning, development, and human performance. There is ample evidence to show that we can experimentally identify and influence a variety of cognitive processes that are involved in new learning, and it appears that the analysis of individual differences in performance can be carried out in terms of such processes (Gagné, 1967). Some exemplary studies along these lines can be referred to as illustration (Hunt, Frost, and Lunneborg, undated; Rohwer, 1970; Rosner, 1972). Studies such as these support the promise of a line of research on individual differences in terms of cognitive processes. I would urge that studies attempt to identify the kinds of processes required by various tasks, and to characterize how individuals perform these processes. The conditions required to learn the task could then be adapted to these individual characteristics, or the individual might be taught how to engage more effectively in these processes.

Another sign of support for the theme of process concepts as individual difference variables comes from the work on cognitive styles or personality characteristics that influence learning and performance (Kagan and Kogan, 1970). Here, the influence of individual differences in non-cognitive domains on the cognitive processes involved in problem solving is being systematically studied. This includes research on the effects of cultural background on the dominance of visual, auditory, or tactile sense modalities; the relationship between anxiety and the quality of immediate memory; the ability to hold changing images in memory, what personality theorists have called "leveling and sharpening;" and the degree to which an individual pauses to evaluate the quality of cognitive products in the course of problem solving, generally referred to as differences in reflection and impulsivity.

The processes that make up cognitive style are important to consider in the education of culturally disadvantaged children. As we know, early experience in a particular cultural environment provides the child with a set of values and a set of techniques and skills for learning to learn and for processing incoming information. It has been pointed out that the middle-class child acquires these things so that they are continuous with what will be required of him in school. Whereas, what a lower socio-economic-class child acquires may be discontinuous with what school demands. In a non-adaptive environment for learning, "cultural deprivation" is defined in terms of a set of experiences that establishes a discontinuity between pre-school experiences and school requirements. In the adaptive educational environment that I envision, it would be assumed as a matter of course that the values, styles, and learning processes that the child brings to school are of intrinsic functional worth as a basis for a program of education (Getzels, 1966).

The work and theories of Piaget quite directly support and influence my theme of the importance of modifiable behavioral processes in adaptive education as opposed to notions of relatively fixed intelligence and aptitude. The stages of cognitive development described in the Piagetian theory of intelligence are thought to mark major qualitative changes in the modes of thinking available to the child, and consequently, changes in the kinds of specific learning of which he or she is capable. Adaptive education, as I have indicated, looks at this in two ways: the educational environment accommodates to the existing modes and processes of a learner, and it can also influence these processes through instruction. The stages described by Piaget thus provide individual modes of performance available to different children which would have to be considered in educational design.

Recently, Lauren Resnick and I (1972) carried out a detailed survey on the possible teachability of basic aptitudes and Piagetian processes. We noted that a number of studies have appeared which offer grounds for suggesting the possibility of developing operational thinking through instruction. However, as we completed this survey, we were struck with the fact that our search for work on the instructability of basic abilities uncovered far fewer studies on the training of psychometrically defined aptitudes and abilities than on the training

of Piagetian and related concepts. This raises the question of why the Piagetian definition of intelligence has stimulated so much more instructional research than has the psychometric one.

One answer seems to be that Piagetian theory is not concerned with differential prediction, but with explication of developmental changes in thought structures and the influence of these structures on performance. This emphasis suggests a variety of specific performances on which to focus instructional attention, and also suggests hypotheses concerning the optimal character and sequence of instructional attempts. In contrast, most psychometric tests of intelligence and aptitude consist of items chosen because of their predictive power rather than their relationship to observed or hypothesized intellectual processes. Thus, they offer few concrete suggestions as to what or how to teach. It appears, then, that successful attempts to adapt instruction to individual differences will depend upon a line of research emphasizing process variables in human performance.

The rise of the "new aptitudes" is also forecast by the notion of interactionism whereby accommodative changes in an individual's performance occur in the course of encounters with environmental circumstances. This has been emphasized by such diverse points of view as Piaget's and Skinner's, and currently is well expressed by Bandura in his writings on social learning theory (Bandura, 1969, 1971). We know now that psychological functioning is a continuing reciprocal interaction between the behavior of an organism and the controlling conditions in the environment. Behavior partly creates the environment, and the resultant environment influences the behavior. This is clearly seen in social interaction, for example, where a person plays an active role in bringing out a positive or negative response in others, and in this way, creates, to some degree, environmental contingencies for himself through his own behavior. This is a two-way causal process in which the environment might be just as influencable as the behavior it regulates. The actual environment an individual experiences can be a function of his behavior if the environment is an adaptive one.

Our penchant for a fixed educational mode arises in part from an old-fashioned psychology, from the scientific and social tendency to think in terms of fixed categories of human beings with consistent drives and dispositions (Mischel, 1969). We think this way, rather than in terms of human beings who are highly responsive to the conditions around them so that as conditions change or conditions are maintained, individuals act accordingly. Adaptive educational environments can take advantage of the fact that individuals show great subtlety in adapting their competencies to different situations, if the situation permits such adaptability. Although individuals show generalized consistent behavior on the basis of which we frequently characterize them, this does not preclude their also being very good at discriminating and reacting to a variety of experiences in different ways. The traditional measures of general ability and aptitudes err on the side of assuming too much consistency, and deemphasize the capability of individuals to devise plans and actions depending upon the rules, needs, and demands of alternative situations. If, in our thinking about individual differences, we make as much room for the capability of individuals to adapt and change, as well as to be stable, and as much room for the capacity for self-regulation and self-development, as well as for victimization by enduring traits, then an adaptive notion of education must follow. An educational system should present alternative environments that enhance the ability of the individual for self-regulation in different possible situations for learning.

In conclusion, it should be said that the nature of a society determines the nature of the educational system that it fosters, and educational systems tend to feed into the existing social practices. If this is so, then an adaptive educational system carried to its ultimate conclusion may be out of joint with present social structure. An adaptive environment assumes many ways of succeeding and many goals available from which to choose. It assumes further that no particular way of succeeding is greatly valued over the other. In our current selective environment, it is quite clear that the way of succeeding that is most valued is within the relatively fixed system provided. Success in society is defined primarily in terms of the attainment of occupations directly related to the products of this system. School-related occupations are the most valued, the most rewarding, and seen as the most desirable. However, if an adaptive mode becomes prevalent and wider constellations of human abilities are emphasized, then success will have to be differently defined; and many more alternative ways of succeeding will have to be appropriately rewarded than is presently the case.

* * *

References:

Angoff, W. H. (ed.)
1971 The College Board Admissions Testing Program: A Technical Report on Research and Development Activities Relating to the Scholastic Aptitude Test and Achievement Tests. New York: College Entrance Examination Board.

Bandura, A.
1969 Principles of Behavior Modification. New York: Holt, Rinehart, and Winston.

1971 Social Learning Theory. New York: McCaleb-Seiler.

Bracht, G. H.
1969 The Relationship of Treatment Tasks, Personological Variables and Dependent Variables to Aptitude-Treatment Interaction. Boulder: University of Colorado, Laboratory of Educational Research.

Bracht, G. H. and Glass, G. V.
1968 The External Validity of Experiments. American Educational Research Journal, 5, 437-474.

Cronbach, L. J.
1957 The Two Disciplines of Scientific Psychology. Address of the President at the Meeting of the American Psychological Association, New York, September.

1970 Essentials of Psychological Testing. Third Edition. New York: Harper and Row.

Cronbach, L. J. and Gleser, G. C.
1965 Psychological Tests and Personnel Decisions. Second Edition. Urbana: University of Illinois Press.

Cronbach, L. J. and Snow, R. E.
1969 Individual Differences in Learning Ability as a Function of Instructional Variables. Stanford: School of Education, Stanford University.

Gagné, R. M. (ed.)
1967 Learning and Individual Differences. Columbus: Charles E. Merrill.

Getzels, J. W.
1966 Pre-School Education. Teachers College Record, 68, 219-228.

Glaser, R.
1972 Individuals and Learning: The New Aptitudes. Educational Researcher, 1 (6), 5-13.

Glaser, R. and Resnick, L. B.
1972 Instructional Psychology. In P. H. Mussen and M. R. Rosenzweig (eds.). Annual Review of Psychology. Palo Alto: Annual Review, pp. 207-76.

Hunt, E., Frost, N., and Lunneborg, C.
undated
Individual Differences in Cognition: A New Approach to Intelligence. Seattle: University of Washington, Department of Psychology.

Kagan, J. and Kogan, N.
1970 Individual Variation in Cognitive Processes. In P. H. Mussen (ed.). Carmichael's Manual of Child Psychology. Vol. 1 (Third Edition). New York: Wiley, pp. 1273-1365.

McNemar, Q.
1964 Lost: Our Intelligence? Why? American Psychologist, 19, 871-882.

Mischel, W.
1969 Continuity and Change in Personality. American Psychologist, 24, 1012-1018.

Rohwer, W. D., Jr.
1970 Images and Pictures in Children's Learning. Psychological Bulletin, 73, 393-403.

Rosner, J.
1972 A Formative Evaluation of the Perceptual Skills Curriculum Project. Pittsburgh: University of Pittsburgh, Learning Research and Development Center.

Thorndike, E. L.
1911 Individuality. Boston: Houghton-Mifflin.

Tyler, L. E.
1965 The Psychology of Human Differences. (Third Edition) New York: Appleton-Century-Crofts.

Washburne, C. N.
1925 Adapting the Schools to Individual Differences. In Twenty-Fourth Yearbook of the National Society for the Study of Education, Part II. Chicago, NSSE.

Wing, C. W., Jr. and Wallach, M. A.
1971 College Admissions and the Psychology of Talent. New York: Holt, Rinehart, and Winston.